

REPORT ON OPHTHALMOLOGY.

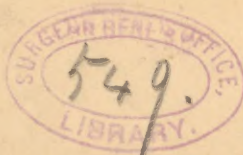
By O. F. WADSWORTH, M.D.

THE CROSSING OF NERVE FIBRES IN THE CHIASMA.

The theory of the semi-decussation of the optic nerves in the chiasma has, since the time of Wollaston, been generally accepted. With very few exceptions, it explained satisfactorily the alterations in the shape of the field of vision observed in cerebral disease, and particularly did it offer a ready solution (in the affection of one optic tract) of the not infrequent cases of stationary, sharply defined loss of function in the right or left halves of the retinae. The latter seemed, indeed, hardly understandable on any other supposition. Anatomical proof did not seem to be wanting.

It would appear now as if this theory must be abandoned. Biesiadecki, in 1861 (*Sitzungsberichte der Math.-naturwiss. Classe. Wien.*) convinced himself, by anatomical investigation, that total crossing of the nerve fibres in the chiasma occurred, but his views found no acceptance. Since then, however, testimony in their favor has been accumulating. Paulowski, in 1869, whose work was only published in Russian, arrived at similar results. Gudden (*Archiv für Psychiatrie*, 1870), by experiments on young rabbits, removing a portion of the corpora quadrigemina and thalamus optici on one side, or destroying one retina, found atrophy of one optic tract and the opposite optic nerve, and, with the microscope, demonstrated complete crossing of fibres in the chiasma. Brown-Séquard (*Archives de Physiologie*, March, 1872; *Archives of Scientific and Practical Medicine*, ii., 1873; *JOURNAL*, November 7, 1872), basing on pathological observations and experiments, denied the truth of Wollaston's theory, but his view would accord still less with total than with semi-decussation. Knoll (*Centralblatt*, 17, 1872; *JOURNAL*, November, 7, 1872) found reflex contraction of the pupil wanting on one side when the opposite tract was divided; but only inferred total crossing of special fibres which transmit the stimulus from the optic to the oculo-motorius. Finally, Mandelstamm* and Michel (*Graefe's Archiv*, xix. 2), the one in Vienna, the other in Leipsic, have confirmed Biesiadecki's statement by anatomical researches, and find that all the fibres of the optic nerves cross at the chiasma. The independence of their observations, as well as the fact that they employed chiefly different methods, makes the generally very exact agreement of their detailed results all the more convincing. There appear to be, however, certain discrepancies on a few points which, perhaps unavoidable in the working out of a subject so difficult, and partly to be explained by the difference in the methods employed, may yet leave a loophole for doubt for the advocates of semi-decussation. Mandelstamm hardened the human chiasma, and, after dissolving the connective tissue with concentrated solution of potash, picked out the different bundles of nerve fibres with fine forceps. A bundle of nerve fibres at the inner surface of the optic nerve curves downward around the nerve and crosses on the under surface

* For a translation of a part of Mandelstamm's article, by Dr. H. W. Williams, see *JOURNAL*, March 26, 1874.



of the chiasma, while the outermost of the fibres coming from the tractus to the superior surface of the chiasma curve down around its outer angle and also cross on its lower surface. With this exception, the bundles cross without special change of level; the innermost fibres of the nerve running along the anterior angle of the chiasma to reach the opposite tract, the outermost along the outer to curve and cross at the posterior angle. The more anterior the fibres are situated, the sooner do they cross. Horizontal sections of the hardened chiasma, he regards as suited to assist the judgment arrived at by picking out the fibres, but as not sufficient of themselves to decide the question. Experiments made on rabbits, after the manner of Gudden, gave him like results, i. e., atrophy of nerve and tract of opposite sides.

Michel examined the chiasma in fishes, amphibia, birds, mammals and man by sections, chiefly horizontal, but, also, in other directions. Except in fishes, where the nerves simply overlies each other, he found that in the total crossing of the fibres the nerve bundles interlaced so as to form a sort of basket-work, the size of the interlacing bundles varying in different species, and the most posteriorly situated being smaller than the more anterior in the same chiasma. In man were some layers, also, which crossed without interlacing. The course of the fibres in their passage from one side to the other through the chiasma agrees with the description given by Mandelstamm. In the chiasma of a dog, with congenital malformation of one eye and atrophy of corresponding nerve and opposite tract, the crossing of the atrophied nerve bundles could be plainly traced. The few bundles which Mandelstamm described as curving from upper to lower surface of the chiasma, Michel makes no mention of, but they would very likely escape observation by the method he employed.

Both observers deny the existence of an anterior commissure; and both, while describing a narrow layer of fibres resembling a posterior commissure, state that this layer is separated from the chiasma by a layer of grey substance.

Mandelstamm does not appear to have observed the interlacement of nerve bundles which Michel prominently describes and figures, yet, if the latter is correct, it is difficult to see how they could have escaped notice in the process of picking out and following the various nerve bundles. Mandelstamm, again, states that in the rabbit the one nerve crosses above the other, while Michel found in the rabbit, as in various other mammals, that the bundles of the two nerves formed, in crossing, a regular, delicate basket-work.

The acceptance of a total crossing, Mandelstamm considers suited to fill any gaps at present existing in the determination of the locality of an affection of the brain, and in remarkable accordance with all hitherto observed pathological changes. Without a very great change in our present knowledge of the origin and distribution of the optic nerve fibres, however, this acceptance could never explain the cases of sharply-defined, symmetrical, lateral hemiopia (loss of function in the right or left halves of both retinae). The less frequent cases of loss of function in the outer sides of both retinae would, indeed, be more easily explained, since there need only be supposed a lesion affecting one of the outer angles of the chiasma, instead of, as hitherto believed, an affection of both the outer angles, or of the outer side of both tracts or nerves. But such defects of the field of vision, as well as all others,

except the lateral hemiopias, are never stationary, sharply defined and symmetrical. The report of the single case examined *post mortem*, which Mandelstamm has been able to adduce to show that a tumor behind the chiasma produces a loss of function in the outer side of both retinae, is too defective in important particulars bearing on this point to be of any special value, while a case reported by Knapp (*Archives of Scientific and Practical Medicine*, No. 4, 1873), in which stiff, atheromatous arteries were in contact with both outer sides of chiasma and optic nerves, furnishes *at least* as strong an argument for the old view.

Michel admits the difficulties in the way of explaining the sharply defined lateral hemiopias with total crossing of fibres, and does not attempt any solution of the problem. He describes a pouch, covering the upper surface of the chiasma and separated from it by a thin layer of grey matter, which communicates with the third ventricle, and points the importance this pouch may have in the production of loss of function in more or less of the nerve fibres when there is a collection of fluid in the ventricles.

The practical importance of the views above given is sufficient to stimulate inquiry, and it cannot be doubted they will soon be confirmed or denied by other workers in the same field.

INFLAMMATION OF THE CORNEA.

Eberth (*Centralblatt*, xix. and xxxii., 1873), in the former of his papers, sought to prove, from the results of experiments, that the severity of inflammatory processes in the cornea, after a trauma, does not depend so much on the severity of the wound itself as on the number of bacteria carried into the cornea by the wounding body. He found, also, that the changes produced when a silken thread was left in the cornea were the same as when the cornea was inoculated with the bacteria from diphtheria of the throat, and deduced identity of the disease. From another series of experiments, he concludes that the presence of similar organisms forms an essential part of the keratitis following paralysis or section of the fifth nerve. After section of this nerve in rabbits, there occurs slight exophthalmos, diminished sensibility of cornea and less frequent winking; the drying of the exposed surface of the uncovered cornea causes a change in the epithelium and allows the organisms floating in the air to gain a foothold. The keratitis which follows does not differ, to the eye, from true diphtheritis of the cornea, and the microscope shows, as in diphtheritis, bacteria, scattered and in groups, in the affected tissues. The differences in degree and rapidity with which the changes in the cornea occur depend on the rapidity and extent of drying of the surface, on the presence or absence of slight injuries causing abrasion of the epithelium, and on the amount of micrococci in the air.

The results of investigations by Stromeyer, as to the causes of hypopion-keratitis (*Graefe's Archiv*, xix., 2), point also to the influence of bacteria. Bits of metal, carefully cleaned, and introduced into the cornea so as to allow the wound to readily close behind them, excited but little inflammation, and that in proportion to the readiness with which oxydation from contact with the corneal fluids took place. Septic material, containing bacteria, leptothrix buccalis and decaying muscle, placed between the lamellæ of the cornea excited rapid and

extensive keratitis, with extension of the inflammation to the scleral border, ciliary body and iris, and hypopion. The same series of changes sometimes occurred when perfectly fresh muscle substance was employed; sometimes the inflammatory reaction was slight. Examination showed that, in the former instances, the bits of muscle had become rapidly infiltrated with bacteria, while, in the latter, closure of the external wound had prevented their introduction. In one case, where a bit of fresh muscle was introduced into the anterior chamber, its presence was perfectly tolerated, and, at the end of three weeks, it was in great part absorbed. The cases of keratitis in persons affected with blenorrhœa of the lachrymal sac present strong points of resemblance to keratitis produced by septic inoculation. The source of the pus forming the hypopion is that portion of the ciliary body situated in the angle of the anterior chamber and the circulus venosus of Leber; very probably, also, in many cases, the iris takes part in its production. The anatomical appearances found negative decidedly the opinion that hypopion occurs by sinking of pus corpuscles in the posterior lamellæ of the cornea behind the membrane of Descemet, or that they reach the anterior chamber by direct passage backward from the seat of ulceration.

Boettcher (*Virchow's Archiv*, 58, 3), believing that the emigration of white blood-corpuscles into the cornea, which Cohnheim and others have described in traumatic keratitis, was due to the great amount of irritation excited, sought to confine the destruction of tissue to as small and central a spot as possible. When this was effected, he found no evidence of emigration of white corpuscles, and while the corneal corpuscles were destroyed in the immediate vicinity of the eschar formed, those in the peripheral parts showed no notable change. In the injured part, fissures appear in the basis substance, containing fine granules, which gradually enlarge and become pus corpuscles. The pus cells, therefore, originate on the spot by free cell-formation from protoplasmic granules brought to the seat of injury in the increased amount of nutritive fluid attracted by the irritation.

The experiments of Sinitzin (*JOURNAL*, November 7, 1872), which appeared to demonstrate that keratitis following section of the fifth nerve is averted by removal of the upper cervical ganglion of the sympathetic, have been repeated by Eckhard (*Centralblatt*, 35, 1873) with a contrary result. In only one case did the characteristic changes in the eye fail to follow division of the fifth after removal of the cervical ganglion. In the solitary exception, it was found that the median fibres of the trigeminus had escaped division, though complete anæsthesia of the cornea had been produced.

Reich, also (*Graefe's Archiv*, xix., 3), in the course of experiments to determine the nerves presiding over the secretion of tears, found that extirpation of the upper cervical ganglion of the sympathetic did not prevent neuro-paralytic keratitis after division of the trigeminus.

Von Tannhofer (*Central-Zeitung*, 46, 1873) describes the nerves of the cornea as running in lymph-canals lined with endothelium, and states that, in keratitis, the white blood-corpuscles wander along these canals, often by their number completely hiding the nerves from sight. He believes, also, that he has been able to trace the anatomical continuity of the fine terminations of the nerves with corneal corpuscles.

STRYCHNIA IN AFFECTIONS OF VISION.

So much has been written in the last three or four years on the treatment of defects of vision by strychnia, so many and so various have been the published cases in which it has appeared to be of benefit, and so different the indications and counter-indications for its use given by different writers (while some have not been able to convince themselves of its efficacy at all), that it is interesting to compare the conclusions reached by two independent observers as to its action on the eye, both in health and disease. (v. Hippel. *Wirkung des Strychnins auf d. normale u. Kranke Auge*, Berlin, 1873. Cohn. *Wirkung des Strychnin auf amblyopische u. gesunde Augen*, *Wiener Medizinische Wochenschrift*, No. 42-47, 1873.) It was, perhaps, to be expected that their views would vary somewhat as to its value in pathological conditions (they appear to be almost diametrically opposed), but hardly that they should differ so much as they do regarding its effects on the normal eye.

Von Hippel's experiments on the normal eye were made on himself, Cohn's on one of his pupils; the observations of both seem to have been made with care. Both injected the strychnia subcutaneously on the temple. Cohn in the dose of two milligrammes; v. Hippel, generally, three milligrammes. Both found that the sharpness of vision for Snellen's types was somewhat increased by the drug, but only in the eye on the side the injection was made; Cohn states that the increase of vision lasted during fourteen days; v. Hippel that it always returned to the normal state in twenty-four hours. V. Hippel, alone, tested also the indirect vision, and found the size of the field over which two black dots on a white ground could be distinguished as separate was very much increased by strychnia. The field in which white could be distinguished, in v. Hippel's case, was decidedly enlarged, and, after three injections on each side, remained somewhat larger than before the injection, for at least four weeks, he says, "permanently." Cohn, after nine injections, found the alteration in the field for white so slight that it might well have been due to error of observation. The field in which different colors could be distinguished, v. Hippel found increased under the influence of strychnia only for blue on a black ground, for this it was much larger in all directions; Cohn found the field larger both for blue and red, but only in certain directions, and to a less degree. Both observers made their measurements of the field with Förster's perimeter, and with test objects of the same size. Both, using somewhat different methods, found the least amount of light necessary for accurate perception of objects uninfluenced by strychnia; v. Hippel also found no change in the amount, or power of maintaining accommodation, or in the size of the pupil, and after injecting three milligrammes of strychnia into the arm could detect no variation in acuteness or size of the field of vision.

As regards the use of strychnia in disease, they differ, as stated above, widely. Both use the same dose, i. e. two milligrammes. Cohn agrees with Woinow, that if no improvement be obtained after two injections, none can be expected, and apparently endorses the latter's statement that no benefit occurs when, besides diminution of vision, inability to distinguish colors is present. Von Hippel has seen improvement commence in some cases only after six or eight injections, and states that, although ability to distinguish colors is not re-

stored, yet its absence does not require an unfavorable prognosis. Cohn, in this, as in a former paper (Report Nov. 14, 1872), finds the chief benefit of strychnia in cases of hypermetropia or emmetropia with amblyopia, without ophthalmoscopic change; v. Hippel in cases with signs of atrophy of the optic nerve. They sum up as follows: Cohn:—In all cases where the ophthalmoscope does not explain the amblyopia, the trial of strychnia is indicated. Very doubtful is the result if there is any trace of beginning degeneration of the opticus; absolutely useless are the injections when evident atrophy of the nerve is present. Von. Hippel:—Strychnia is well suited to take that position in regard to the opticus which we give to the constant current in regard to other nerves. Its most brilliant effect appears in conditions which without it are absolutely unreachd by our therapeutics; in atrophy of the opticus from the most various causes.

Taylor (*Lancet*, Dec. 13, 1873) reports very briefly three cases of atrophy of the optic disc, in which great and rapid improvement in vision followed the subcutaneous injection of strychnia. In a fourth case, there was, also, considerable improvement. Taylor used one-twelfth of a grain twice daily, a much larger dose than Cohn and v. Hippel employed. He states that he has used strychnia in many other cases, apparently similar, without result, and that it is impossible to say, beforehand, which cases will be benefitted and which not.

SARCOMA OF THE IRIS.

Robertson and Knapp report (*Archives of Ophthalmology and Otolaryngology*, III. 2) a case of melanotic sarcoma of the iris for which the eye was removed. The tumor, when first observed, was single near the upper and ciliary margin of the iris. Vision had been noticed to be quite dim six months before. There was increased tension, and glaucomatous cupping of the disc. Two months later the original tumor had more than doubled in size, and three other smaller tumors were seen. Subsequent examination showed, beside the tumors previously seen, numerous minute rounded elevations. Sections of the iris showed its anterior layer thickened and studded with small tumors; where the larger tumors were, the middle layer had disappeared. The tumors were made up chiefly of spindle and round cells with pigment, and contained numerous large vessels. The patient was well two years after removal of the eye.

Carter (*Lancet*, Dec. 20, 1873) exhibited a patient of 15 years to the Clinical Society of London with tumors of the iris in both eyes, which were steadily increasing. Six weeks before, a similar tumor, the size of a split pea, the first which had been noticed, and the only one at that time in the left eye, had been removed, with a portion of the iris. A fresh tumor had appeared in the eye since the operation. The tumor removed proved to be a round cell sarcoma.

AMYLOID DEGENERATION OF THE CHOROIDAL ARTERIES.

Knapp (*Archives of Ophthalmology and Otolaryngology*, III. 2) reports a case of this hitherto undescribed affection. A gentleman, aged 42, after a night spent in dancing, drinking and smoking, noticed nearly total loss of sight in the left eye. The other eye was quite normal. There was evident hæmorrhage into the vitreous, and as this did not clear up as signs of irritation passed off, but became darker, it was

supposed that a tumor of the choroid might have given rise to the hæmorrhage, and five weeks later the eye was enucleated. No tumor was found, but in the blood in the vitreous chamber, and also in blood effused between retina and choroid and choroid and sclera, numerous round, hyaline bodies, from the size of a white blood corpuscle to two or three times as large, were present, in some places in greater number than the blood corpuscles. These offered the reactions of amyloid bodies. The calibre of the arteries of the choroid was much reduced, and the addition of iodine gave the characteristic brown-red color of amyloid degeneration in their inner and middle coats. As amyloid degeneration is considered not a local but general disease, the patient was carefully and repeatedly examined, but without detection of any deviation from health, nor was there a history of any of the affections usually supposed to lead to amyloid disease.

STRICTURE OF NASAL CANAL WITHOUT DILATATION OF THE LACHRYMAL SAC.

Becker (*Graefe's Archiv*, XIX 3) points out the importance of careful examination by means of the probe, as to the existence of stricture of the nasal canal in cases of chronic catarrhal affections of the conjunctiva, especially when only one eye is affected. It is well recognized that such affections are often caused and maintained by stricture of the nasal canal; but it is also generally assumed that if stricture exist for a long time dilatation of the lachrymal sac must also be present, which, if not evident to the eye, may yet be recognized by the touch, gentle pressure causing the fluid in the sac to pass down into the nose or up into the conjunctival sac. He shows by the report of two cases that the latter assumption is not always correct. Stricture of the canal may exist without dilatation of the sac. In both his cases, there was decided papillary hypertrophy of the conjunctiva, dating from, respectively, 18 and 30 years; in one the right eye only, in the other both eyes, were diseased; both had been treated without result by well known oculists; in neither did pressure reveal any affection of the lachrymal sac. The probe, however, showed stricture at the entrance of the nasal canal, and, so soon as this was overcome, the conjunctival trouble, without other treatment, disappeared.

GALVANO-CAUTERY IN OPHTHALMIC SURGERY.

Samelsohn (*Archives of Ophthalmology and Otology*, III. 2) recommends galvano-cautery for certain diseases of the conjunctiva and adnexa of the eye. Latterly, he has employed two Genet-Stöhrer elements filled with bichromate of potash and dilute sulphuric acid. The method may be used for the closure of old lachrymal fistula, or obliteration of the lachrymal sac. Fortunately, the latter operation is seldom, if ever, necessary. In partial trichiasis, Samelsohn states that the galvano-cautery has always given him satisfactory results. Streetfeild's or Snellen's operation (excision of a wedge-shaped piece of the tarsus) may often be of advantage when the upper lid is affected, but is scarcely applicable to the lower lid. The idea governing the application of the cautery is to exercise by contraction of a cicatrix in the cartilage a traction upon the tissue covering it. The eye is protected by a spatula under the lid, and a hole is burned into the tarsus below the roots of the inverted lashes with a fine galvano-cautery. The result, as stated, is excellent. Other cautery than galvano-cau-

tery will hardly answer the purpose, since it cannot be made to penetrate deep enough, at least without too much injury of the skin.

In chronic gelatinous granulations of the conjunctiva, Samelsohn recognizes the general harmfulness of caustics, but, in view of the generally admitted fact that cicatricial contraction always occurs under any treatment, was led to the idea that, if the cautery were limited to the isolated granulations, their pressure on the neighboring tissues might be removed and too great contraction prevented. To this end, he applied the cautery lightly to the centre of each granulation with a fine platinum wire, cauterizing only a few at each sitting, at intervals of a week. The operation was painless, the reaction slight. In the five cases so treated the result is described as very favorable; very slight linear scars were left, and there was no deformity of the cartilage.

RAPID CHANGES OF REFRACTION IN THE EYE.

At the last meeting of the Heidelberg Ophthalmological Society, Horner (*Monatsblätter für Augenheilkunde*, 1873) related two interesting cases of rapid change in the refraction of the eye. A man of 61 years, myopic from childhood, wearing $-4\frac{1}{2}$ glasses, in the middle of May, 1871, remarked a sudden change in the left eye. A small separation of the retina was found; myopia $\frac{1}{5}$, V = $\frac{1}{5}$. The separation increased and the myopia correspondingly diminished to $\frac{1}{8}$, $\frac{1}{12}$, $\frac{1}{15}$. In the middle of June, there was even hypermetropia $\frac{1}{35}$, and V had risen to $\frac{1}{3}$. The patient was now in better condition without a glass than formerly with one, but toward the end of the year another change took place, and again concave glasses were of benefit. On Feb. 4, 1872, in the same left eye, the retina had returned to its proper position; myopia was $\frac{1}{5}$, V still $\frac{1}{5}$. The right eye, which had always been the weaker, remained throughout myopic $\frac{1}{3}$, its V between $\frac{1}{7}$ and $\frac{1}{5}$. Isolated instances of reposition of the retina after separation, with restoration of function, are not unknown; but, so far as the reporter is aware, no case in which so perfect function has been maintained during the separation has been before observed.

The second case was that of a lady of 55 years, who, in September, 1870, still read, during the day, print and music without a glass, and only by artificial light or on dark days used convex $\frac{1}{4}$ L. and $\frac{1}{4}$ R. Since August, she had suffered from diabetes mellitus, passing a very large amount of urine containing much sugar. Toward the end of October, vision became rapidly worse, and her glasses no longer served. Horner saw her on Nov. 19th, and found hypermetropia $\frac{1}{4}$, V. R. = 1, L. = $\frac{5}{8}$; normal fundus, and no sign of opacity of the lens. She was already under treatment for the diabetes, and had begun to improve. The quantity of urine and sugar continually diminished, and the glasses ordered in November became useless. On Jan. 13, 1871, the hypermetropia was reduced to $\frac{1}{8}$.